

## **REMARKS**

In Response to the non-final Office Action dated March 4, 2005, and preliminary to consideration of the RCE, Applicant respectfully request entry of the above amendments and allowance of the claim. Claims 1, 7, 17, 23, 24, 30, 38, 39, 40, and 41 are amended. Claims 14 and 27 are canceled. Claims 1-13, 15-26 and 28-41 are pending.

In paragraphs 7-9 of the Office Action, claims 7, 23, 24, and 41 were objected to due to certain informalities.

Applicant respectfully traverses the objection to the claims. However, in order to advance prosecution of Applicant's Application, claims 7, 23, 24, and 41 are amended. Applicant submits that the amendments to the claims do not narrow or change the scope of Applicant's Application.

In paragraph 10 of the Office Action, the specification was objected to under 35 U.S.C. § 132.

Applicant respectfully traverses the § 132 objection. However, in order to advance prosecution of Applicant's Application, the specification has been amended. Applicant submits that the amendment to the specification do not narrow or change the scope of Applicant's Application.

In paragraph 13, on page 7 of the Office Action, claims 1-8, 10 and 12-16 were rejected under 35 U.S.C. § 103(a) over Hiramoto et al. (U.S. Patent Application Publication No. 2003/0017723). In paragraph 14, on page 7 of the Office Action, claims 17-26, 28-37 and 39-41 are rejected under 35 U.S.C. § 103(a) over Hiramoto as applied to claims 1-8, 10 and 12-16, and further in view of Gill (U.S. Patent No. 6,097,579). In paragraph 15, on page 8 of the Office Action, claim 38 was rejected under 35 U.S.C. § 103(a) over Hiramoto as applied to claims 1-8, 10 and 12-16, and further in view of Gallagher et al. (U.S. Patent No. 5,640,343). In paragraph 16, on page 8 of the Office Action, claim 9 was rejected under 35 U.S.C. § 103(a) over Hiramoto as applied to claims 1-8, 10 and 12-16, and further in view of Slaughter et al. (U.S. Patent Application Publication No. 2004/0041183). In paragraph 17, on page 8 of the Office Action, claim 11 was rejected under 35 U.S.C. § 103(a) over Hiramoto as Modified by Slaughter as applied to claim 9 above, and in further view of Makino et al. (U.S. Patent No. 6,449,133).

Applicant respectfully traverses the rejections, but in the interest of expediting prosecution have amended the claims to overcome the rejections.

Applicant's invention, as recited in independent claims 1, 17, 30 and 38-41, requires "a barrier layer disposed between the first and the second magnetic layers. The barrier layer includes diffusion components from the at least one magnetic layer, wherein the diffusion components form a concentration gradient after migrating from an area of higher concentration of diffusion components in the at least one magnetic layer to an area of lower concentration of diffusion components within the barrier layer, the concentration gradient of the diffusion components in the barrier layer adjusting the one or more properties of the tunnel junction device. The specification and drawings clearly disclose that diffusion components migrate from the at least one magnetic layer into the barrier layer, for example, through an annealing process. Such a process will inherently form a concentration gradient of diffusion components as claimed.

In contrast, Hiramoto et al. merely disclose a process that inhibits oxidation nitriding or carbonization of metal elements M in a magnetic layer. The magnetic layers of Hiramoto et al. include an element Rcp that captures L<sub>ONC</sub> atoms that migrate from the barrier layer to the magnetic layer. Thus, the magnetic layer is prevented from oxidizing, nitriding or carbonation. Accordingly, the focus of Hiramoto et al. is to allow L<sub>ONC</sub> atoms to migrate from the barrier layer to an adjacent magnetic layer while being absorbed in the magnetic layer by the Rcp element. Hiramoto et al. clearly teaches away from the element Rcp migrating into the barrier layer. This is direct opposite to Applicant's invention wherein diffusion components in the magnetic layer are caused to migrate into the barrier layer.

Therefore, Hiramoto et al. fail to disclose, teach or suggest "the diffusion components form a concentration gradient after migrating from an area of higher concentration in the at least one magnetic layer to an area of lower concentration within the barrier layer, the concentration gradient of the diffusion components in the barrier layer adjusting the one or more properties of the tunnel junction device."

Gill is cited as merely teaching a current source and a detector coupled to the first and second magnetic layer. Accordingly, Gill fails to remedy the deficiencies of Hiramoto et al. Thus, Hiramoto et al. and Gill, alone or in combination, fail to disclose, teach or suggest "the diffusion components form a concentration gradient after migrating from an area of higher

concentration in the at least one magnetic layer to an area of lower concentration within the barrier layer, the concentration gradient of the diffusion components in the barrier layer adjusting the one or more properties of the tunnel junction device.”

Gallagher is cited as merely teaching a memory device including an array of memory elements as recited in claim 38. Accordingly, Gallagher fails to remedy the deficiencies of Hiramoto et al. and Gill. Thus, Hiramoto et al., Gill and Gallagher, alone or in combination, fail to disclose, teach or suggest “the diffusion components form a concentration gradient after migrating from an area of higher concentration in the at least one magnetic layer to an area of lower concentration within the barrier layer, the concentration gradient of the diffusion components in the barrier layer adjusting the one or more properties of the tunnel junction device.”

Slaughter is cited as merely teaching the use of about 5-10 atomic % Hf as recited in claim 9. Accordingly, Slaughter fails to remedy the deficiencies of Hiramoto et al., Gill and Gallagher. Thus, Hiramoto et al., Gill, Gallagher and Slaughter, alone or in combination, fail to disclose, teach or suggest “the diffusion components form a concentration gradient after migrating from an area of higher concentration in the at least one magnetic layer to an area of lower concentration within the barrier layer, the concentration gradient of the diffusion components in the barrier layer adjusting the one or more properties of the tunnel junction device.”

Makino et al. is cited as merely teaching a CoFe alloy containing about 5-10 atomic % Zr as recited in claim 11. Accordingly, Slaughter fails to remedy the deficiencies of Hiramoto et al., Gill, Gallagher and Slaughter. Thus, Hiramoto et al., Gill, Gallagher, Slaughter and Makino et al., alone or in combination, fail to disclose, teach or suggest “the diffusion components form a concentration gradient after migrating from an area of higher concentration in the at least one magnetic layer to an area of lower concentration within the barrier layer, the concentration gradient of the diffusion components in the barrier layer adjusting the one or more properties of the tunnel junction device.”

Still further, Applicant submits that the § 103(a) rejection should be removed because the Office Action does not provide a reason why one would modify Hiramoto. Only broad conclusory statements have been made regarding the use of Hiramoto for forming an MTJ device

without providing evidence of motivation of why one skilled in the art would have been motivated to modify Hiramoto to arrive at the present invention as recited in the claims. Furthermore, Applicant has reviewed Hiramoto and cannot find a teaching, disclosure or suggestion for modifying the reference to achieve the claimed limitations. The MPEP indicates that evidence of the reasons one of ordinary skill in the art would have been motivated to select the references and combine them should be specifically identified and shown by some objective teaching in the prior art leading to the modification. *See* MPEP § 2106. In the present instance, the Office Action has neither indicated reasons why one skilled in the art would be motivated to modify Hiramoto, nor provided any evidence of factual teachings, suggestions or incentives from the prior art that lead to the modification. Therefore, Appellant submits that the § 103(a) rejection is improper and should be removed.

Moreover, with respect to the § 103(a) rejections, the alleged motivations for making the asserted combinations are improper for being conclusory and lacking supporting evidence. According to MPEP § 2143.01, “[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.” The alleged motivation for making the Hiramoto-Gill combination is “in Hiramoto that the TMR device is suitable for use as a MR sensor, and the teaching in Gill that a current source and a detector are essential elements of a TMJ sensor, and that such a sensor is appropriately attached to an actuator arm and suspended over a movable recording medium so as to form a sensor device,” merely indicates the references can be combined, but the suggestion of the desirability of the combination is lacking. Therefore, the alleged motivation is improper.

Similarly, the Hiramoto-Gallagher combination motivation “in view of the teaching in Hiramoto that the TMR sensors can be utilized in forming a MRAM device, and the teaching in Gallagher that an MRAM device can be formed by an array of interconnected TMJ sensors,” merely indicates the references can be combined, but the suggestion of the desirability of the combination is lacking. Therefore, the alleged motivation is improper.

The Hiramoto-Slaughter combination motivation “in view of the teaching in Hiramoto that CoFeHf alloys are suitable for use in forming the magnetic layers of a TMR device, and teaching in Slaughter that a CoFeHf alloy containing 5 atomic % HF is especially suited for

forming a magnetic alloy utilized in a MTJ," merely indicates the references can be combined, but the suggestion of the desirability of the combination is lacking. Therefore, the alleged motivation is improper.

The Hiramoto-Slaughter-Makino combination is improper for the reason stated above relating to the Hiramoto-Slaughter combination.

Because the combination of Hiramoto with Gill, Gallagher, Slaughter and/or Makino fails to teach, disclose or suggest all the elements of at least the independent claims, the rejections are improper and should be withdrawn.

Dependent claims 2-13, 15-16, 18-26, 28-29 and 31-37 are also patentable over the cited reference, because they incorporate all of the limitations of the corresponding independent claims 1, 17 and 30. Further dependent claims 2-13, 15-16, 18-26, 28-29 and 31-37 recite additional novel elements and limitations. Applicant reserves the right to argue independently the patentability of these additional novel aspects. Therefore, Applicant respectfully submits that dependent claims 2-13, 15-16, 18-26, 28-29 and 31-37 are patentable over the cited references, and request that the objections to the independent claims be withdrawn.

On the basis of the above amendments and remarks, it is respectfully submitted that the claims are in immediate condition for allowance. Accordingly, reconsideration of this application and its allowance are requested. Please charge/credit Deposit Account No. 50-0996 (HITG.037PA) for any deficiencies/overpayments.

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Attorney for Applicant, David W. Lynch, at 651-686-6633 Ext. 116.

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